



Definition

Windbreaks or shelterbelts are single or multiple rows of trees or shrubs in linear configurations. Living snowfences are an important variation of windbreaks and shelterbelts. The height of the tallest row and overall density of foliage and branches of an individual windbreak/shelterbelt planting greatly influence the size of the nearby area that is protected or sheltered.

Purpose

Windbreaks or shelterbelts are generally established to protect or shelter nearby, leeward areas from troublesome winds. Such plantings are used to reduce wind erosion, protect growing plants (crops and forage), alter microenvironment to enhance plant growth, manage snow, improve irrigation efficiency, and delineate field boundaries. Windbreaks also protect structures and livestock, provide wildlife habitat and travel corridors, enhance aesthetics, and increase carbon storage. Also, when used as a living

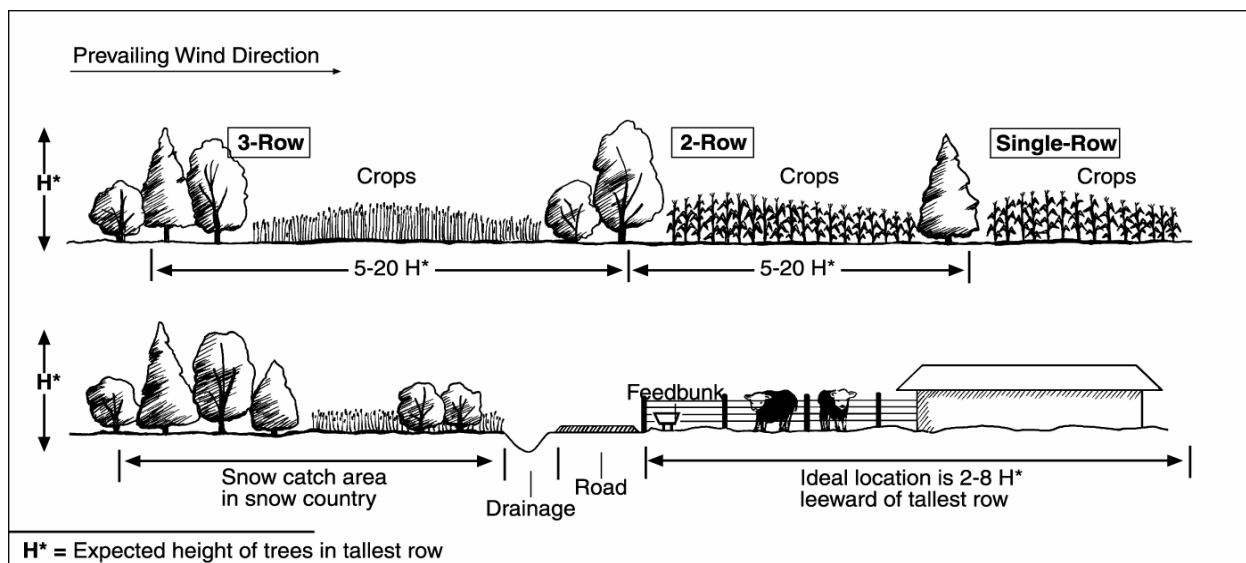
screen, windbreaks control views, reduce noise, and intercept chemical drift.

Where used

Windbreaks are “environmental buffers” that are planted in a variety of settings, such as on cropland, pasture, and rangeland (sometimes referred to as “living barns”); along roads, farmsteads, feedlots; and in urban areas.

Resource management system

Windbreaks and shelterbelts are normally established concurrently with other practices as part of a resource management system for a conservation management unit. For example, conservation crop rotation, residue management, and windbreaks can act together to control wind erosion year-round.



A windbreak or shelterbelt usually consists of multiple rows, with shrubs in the outer rows and taller trees in the interior. Complementary practices work with these environmental buffers to further control wind erosion and snow deposition and modify site characteristics for habitat and screening purposes. For comprehensive protection of a field, windbreaks are placed in a series across the area (typically spaced at intervals of 5 to 20 times the height of each windbreak), with individual windbreaks running parallel to one another, but perpendicular to prevailing winds.

Wildlife

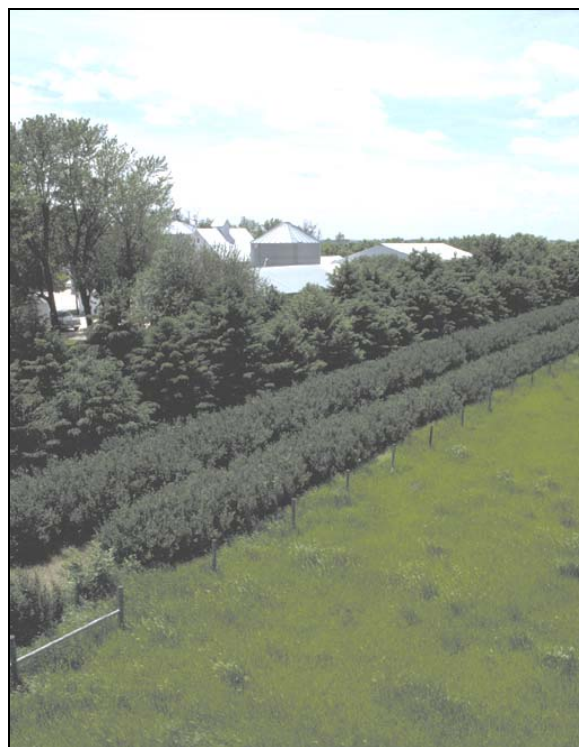
For plantings to function properly, access by livestock and certain wildlife must be managed year-round (use exclusion and fencing). Connecting shelterbelts with existing or planned perennial vegetation, such as woodlots and woody draws (tree/shrub establishment) or riparian areas (riparian forest buffer), provides additional benefits for wildlife and aesthetics. Select native or adapted species that provide wildlife food or cover.

Operation and maintenance

Trees and shrubs in a windbreak or shelterbelt need periodic maintenance and, later on, possible renovation (tree/shrub pruning and windbreak/shelterbelt renovation). In arid areas windbreaks may need supplemental water or the use of water-harvesting techniques for successful establishment.

Specifications

Site-specific requirements are listed on the following pages. Specifications are prepared in accordance with the NRCS Field Office Technical Guide. See practice standard Windbreak/Shelterbelt Establishment, code 380.



This multiple-row windbreak protects the adjacent farmstead and provides important wildlife habitat.

Client/Operating Unit:				Farm No.:	
Farm/Ranch Location:		Field No.:		Program:	
Planned Installation Date:					

Installation shall be in accordance with the following specifications, drawings, and other requirements and comply with applicable federal, state and local laws and regulations during the installation, operation, and maintenance of this practice. No changes are to be made in the specifications without prior approval by an agency representative.

Purpose (check all that apply)

<input type="checkbox"/> Reduce soil erosion from wind	<input type="checkbox"/> Provide noise screens
<input type="checkbox"/> Protect plants from wind-related damage	<input type="checkbox"/> Provide visual screens
<input type="checkbox"/> Alter microenvironment for enhancing plant growth	<input type="checkbox"/> Improve air quality by reducing and intercepting air borne particulate matter, chemicals and odors
<input type="checkbox"/> Manage snow deposition	<input type="checkbox"/> Delineate property and field boundaries
<input type="checkbox"/> Provide shelter for structures, livestock, and people	<input type="checkbox"/> Improve irrigation efficiency
<input type="checkbox"/> Enhance wildlife habitat by providing travel corridors	<input type="checkbox"/> Enhance aesthetics
	<input type="checkbox"/> Increase carbon storage in biomass and soils

Location and Layout

The location and layout of the planting will accomplish the purpose and function intended within a 20-year period (re. Section II eFOTG). Orientation of the windbreak will be as close to perpendicular to the troublesome winds as possible. The maximum design height (H) for the windbreak or shelterbelt shall be the expected height of the tallest row of trees or shrubs at age 20 for the given site. Sites, fields, plants, structures, and livestock are protected within an area 10 times the design height (H) on the leeward side and 2 times the design height (H) on the windward side of the windbreak based on the troublesome wind direction.

For structures and livestock, the area within 2H to 5H on the leeward side is the maximum zone of wind reduction. To accommodate snow drifting and where space is available, the windward row must be a minimum of 150 feet from the primary area or structure being protected.

For reducing wind erosion and protecting growing plants, interval widths between each windbreak in a multiple windbreak system shall not exceed that permitted by the soil loss tolerance (T), or other planned soil loss objective. Calculations shall account for the effects of other practices in the conservation management system. For snow distribution across a field, the interval between barriers will not exceed 20H. Because the windbreak will not be fully functional after installation, temporary measures (e.g., herbaceous wind barriers, temporary snowfences) will be installed for erosion control and/or snow distribution.

Locate noise screens as close to the noise source as practicable. For high-speed traffic noise (e.g., speed limit 50+ mph and frequently used), the barrier shall not be less than 65 feet wide. For moderate speed traffic noise, the barrier width shall not be less than 20 feet wide.

Comply with setbacks for above or below-ground utilities, septic systems, road right-of-ways, and other areas where the windbreak could pose a problem. Layout of the windbreak will assure that anticipated drifting of snow will not cause ingress, egress, safety or drainage problems.

Density Design

Density shall be designed by selection of appropriate plant species, their spacing within rows, and the number of rows. (Density is the percentage of background view concealed by stems, branches, and leaves when viewing from the windward side of the windbreak during the period of troublesome winds.)

Check the applicable density designation.

<input type="checkbox"/> Snow distribution - 25-50% <input type="checkbox"/> Snow accumulation - at least 50% <input type="checkbox"/> Protection of structures, livestock and people - at least 65% <input type="checkbox"/> Noise screens - at least 65%		<input type="checkbox"/> Air quality - at least 50% on the windward side of the source area and, for windbreaks on the downwind side of the source area, at least 65% <input type="checkbox"/> Density for other purposes is generally no less than 50%
25-50% density: <input type="checkbox"/> 1-row - deciduous shrub <input type="checkbox"/> 2-row - deciduous tree and deciduous shrub	50-65% density: <input type="checkbox"/> Twin-row - deciduous shrub <input type="checkbox"/> 1-row - small evergreen tree <input type="checkbox"/> 2-row - evergreen tree and deciduous tree <input type="checkbox"/> 3-row - combination of deciduous trees and deciduous shrubs	65+% density: <input type="checkbox"/> Twin-row - small evergreen tree <input type="checkbox"/> 3 or more row - combination of evergreen trees, deciduous trees, and shrubs

Windbreak Width and Length

Width to achieve purpose(s) and density (feet; include widths of maintenance areas next to outer rows): _____

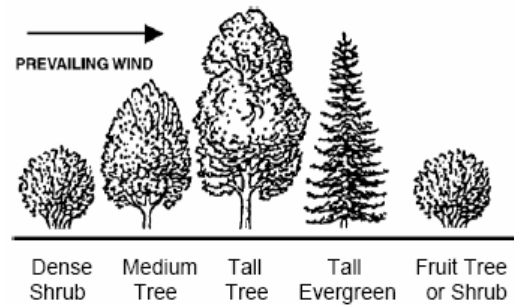
Length sufficient to protect the leeward or downwind site including extra length to compensate for variable wind directions (feet): _____

Area (width x length/43,560 = acres): _____

Woody Plant Materials

Species must be adapted to the soils, climate and site conditions (re. Section II of the eFOTG) and achieve the required density and purpose.

Rows will be arranged so that shrub species are in the outermost windward or leeward rows and tallest species are planted in adjacent rows in the center portion. Each row will generally consist of the same species so that growth rates/form are consistent. Species tolerant of harsh conditions will be planted on the windward side.



General spacing between plants within a row will be: 1) shrubs to 10 feet in height - 3-6 feet apart; 2) small to medium trees 10-25 feet in height - 8-12 feet apart; 3) trees greater than 25 feet in height - 12 to 16 feet apart. Adjust spacing based on individual species characteristics.

Species/cultivar by row number (start with windward row):	Type of stock ¹ :	Distance between plants within row (ft):	Total number of plants for row:	Distance (ft) from this row to next row ² :
1				
2				
3				
4				
5				
6				---

¹BAreroot, COntainer, CUtting; include size, caliper, height, and age as applicable in additional notes.

²Adjusted for width of maintenance equipment for mature plants.

Supplemental Moisture

Moisture conservation or supplemental watering shall be provided for plant establishment and growth where natural precipitation is expected to be too low during the establishment period. Areas less than 10 inches of precipitation require permanent irrigation; 10-14 inch precipitation generally requires supplemental moisture, e.g., weed barrier mulch/fallow or temporary irrigation. Specify associated practices, e.g., Mulching-484 (weed barrier), Irrigation System-Microirrigation-441:

Temporary Storage of Planting Stock

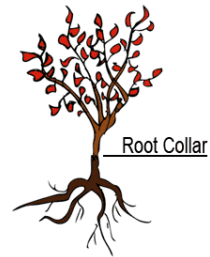
If planting of stock is delayed, dormant stock may be stored temporarily in a cooler or protected area. For stock that is expected to begin growth before planting, dig a V-shaped trench (heeling-in-bed) sufficiently deep and bury seedlings so that all roots are covered by soil. Pack the soil firmly and water thoroughly. Additional requirements:

Site Preparation

One year of fallow for the site to be planted is required at all locations unless supplemental irrigation is provided beginning at the time of planting. Remove debris and control competing vegetation for the previously specified width and length of the planting. The rooting zone must be free of void spaces and debris that would impair root survival. Prepare supplemental moisture materials for installation if required by trees and/or shrubs. Refer to Tree/Shrub Site Preparation - 490. Additional requirements: _____

Planting Methods and Timing

Trees and shrubs may be planted by hand or with a planting machine. For container and bareroot stock, plant stock to a depth level with the root collar in holes deep and wide enough to fully extend the roots. Pack the soil firmly around each plant. Cuttings are inserted in moist soil with at least 2 to 3 buds showing above ground. Planting must be accomplished during a period of adequate moisture (neither too wet nor too dry) provided by natural or supplemental means. Plant only when air temperatures are above freezing and the soil is not frozen. Do not plant on hot, windy days to avoid excessive drying. The seedling roots must not be exposed to the air for more than 30 seconds. Roots of bareroot stock shall be kept moist during planting operations by placing in water-soil (mud) slurry, peat moss, super-absorbent (e.g., polyacrylamide) slurry or other equivalent material. Rooting medium of container or potted stock shall be kept moist at all times by periodic watering. Specify general dates (normal year): _____



Operation and Maintenance

Inspect trees and shrubs periodically and protect from adverse impacts including insects and diseases. The trees or shrubs will also be protected from damage by livestock and, as practicable, harmful wildlife, e.g., bud caps, specialized fencing, tree tubes, and wind protectors. Inspect and replace dead or dying tree/shrub stock and continue control of competing vegetation to allow proper establishment. Prune out dead or dying branches from the windbreak/shelterbelt to maintain its function. Assure that supplemental irrigation is applied as scheduled. Additional requirements: _____

(Provide sketch and/or drawings as necessary or refer to conservation plan or other map.)

[illegible]

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To file a complaint of discrimination write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Practice Specifications Approval and Completion Certification

DESIGN AND INSTALLATION/LAYOUT APPROVAL:

I have job approval authority and certify this practice has been designed with specifications to meet the conservation practice standard and that the client has been advised of installation and layout elements:

NRCS Representative name and title (type or print):		
NRCS Representative Signature:		Date:

LANDOWNER/OPERATOR ACKNOWLEDGES:

- a. I have received a copy of these specifications and understand the contents including the scope and location of the practice.
- b. I have obtained all necessary permits and/or rights in advance of practice application, and will comply with all ordinances and laws pertaining to the application of this practice.
- c. No changes will be made in the installation of the job without prior concurrence of the NRCS.
- d. Maintenance of the installed work is necessary for proper performance during the 25-year life of this practice.

I have reviewed all specifications and agree to install as specified:

Landowner/operator name and title (type or print):		
Landowner/operator Signature:		Date:

RECORD OF COMPLETION AND CHECK OUT CERTIFICATION:

Units (_____)	Date Completed by Client:	Date Certified:	Approver's Initials:

I have job approval authority and certify this practice has been applied and meets design specifications:

NRCS Representative name and title (type or print):		
NRCS Representative Signature:		Date:
Notes:		